

Steven M. Arnold

PUBLICATIONS

Thesis

Ph.D. 1987

"Effects of State Recovery on Creep Buckling Induced by Thermomechanical Loading,"
University of Akron, pp. 376.

M.S. 1984

"A Study of a Mesh Refinement Criterion Based on Typical Finite Element Output,"
University of Akron, pp. 128.

Journal

2005

1. C.J. Lissenden, D. Doraiswamy, and **S.M. Arnold**, 2005, "Experimental Investigation Of Cyclic And Time-Dependent Deformation Of Titanium Alloy At Elevated Temperature," in preparation for *Int. J. Plasticity*.
2. **Arnold, S.M.**, Saleeb, A.F., Powers, L. and Lissenden, C.J.; "High Temperature Characterization and Prediction of Timetal 21S Cyclic and Cyclic-Relaxation Deformation Behavior Using a Multimechanism Viscoelastoplastic Model" in preparation for *Int. J. Plasticity*.
3. Bednarcyk, B.A., **Arnold, S.M.** and Powers, L.M.; "Coupling Analytical Micromechanics with Structural FEA for Micro/Macro Analysis of Titanium Matrix Composites, in preparation for *Int. J. Plasticity*.

2004

4. Bednarcyk, B. A. ,**Arnold, S. M.**, Aboudi, J., and Pindera, M.J.; "Local Field Effects in Titanium Matrix Composites Subject to Fiber-Matrix Debonding", *Int. Jnl of Plasticity*, Vol. 20, pp. 1707-1737, 2004
5. **Arnold, S.M.**, Bednarcyk, B.A., and Aboudi, J.; "Analysis of Internally Cooled Structures Using a Higher Order Theory", *Computers & Structures*, Vol. 82, No.(7-8), pp. 659-688, 2004
6. Saleeb, A.F. and **Arnold, S.M.** ; "Specific Hardening Function Definition and Characterization of A Multimechanism Generalized Potential-Based Viscoelastoplasticity Model", *Int. Jnl of Plasticity*, Vol. 20, pp. 2111-2142, 2004.
7. Pindera, M.J., Aboudi, J. and **Arnold, S.M.**; "Analysis of Spallation Mechanism Suppression in Plasma-Sprayed TBCs Through the Use of Heterogeneous Bond Coat Architectures", submitted special issue of IJP (Quebec City Conference).
8. Tzou, H. S., Chai, W. K., and **Arnold, S.M.**; "Dynamics And Actuation Of Hybrid Electrostrictive/Piezoelectric Thin Shells", submitted *Jnl of Vibration & Acoustics*
9. Tzou H.S.; Lee H.-J.; **Arnold S.M.** "Smart Materials, Precision Sensors/Actuators, Smart Structures, and Structronic Systems", *Mechanics of Advanced Materials and Structures*, Numbers 4-5/July-October 2004, vol. 11, no. 4-5, pp. 367-393(27) Taylor and Francis Ltd.
10. Chai, W.K., Tzou, H.S., and Arnold, S.M.: "Micro-Structronics and Control of Hybrid Electrostrictive/Piezoelectric Thin Shells", accepted by ASME *Jnl of Vibration & Acoustics*.

11. Saleeb, A.F. Marks, J.R., Wilt, T.E. and **Arnold, S.M.** ; "Interactive Software for Material Parameter Characterization of Advanced Engineering Constitutive Models", Adv. Eng. Software, Vol. 35, pp. 383-398, 2004.

2003

12. Aboudi, J., Pindera, M.J. and **Arnold, S.M.**; "Higher-Order Theory for Periodic Multiphase Materials With Inelastic Phases", Int. Jnl. Of Plasticity, Vol. 19, pp. 805-847.
13. Thesken, J. C., Bowman, C. L., **Arnold, S. M.**, and Thompson, R. C., "Time-Temperature Dependent Response of Filament Wound Composites for Flywheel Rotors," *Composite Materials: Testing and Design Fourteenth Volume, ASTM STP 1436*, C.E. Bakis, Ed., ASTM International, West Conshohocken, PA, 2003.
14. Saleeb, A.F., **Arnold, S. M.** and Al-Zoubi, N. R.; "A Study of Time Dependent and Anisotropic Effects on the Deformation Response of Two Flywheel Designs", *Composite Materials: Testing and Design Fourteenth Volume, ASTM STP 1436*, C.E. Bakis, Ed., ASTM International, West Conshohocken, PA, 2003.
15. Bednarcyk, B. and **Arnold, S.M.**; "Micromechanics Based Modeling of Woven Polymer Matrix Composites", AIAA (AMERICAN INST OF AERONAUTICS AND ASTRONAUTICS) Vol. 41, No. 9, pp.1788-1796, 2003.
16. Pindera, M.J., Aboudi, J. and **Arnold, S.M.**, "Analysis of Locally Irregular Composites Using the High Fidelity Generalized Method of Cells", AIAA, Vol. 41, No. 12, pp. 2331-2340, 2003.

2002

17. Bednarcyk, B. A., and **Arnold, S. M.**, "Transverse Tensile and Creep Modeling of Continuously Reinforced Titanium Composites with Local Debonding", IJSS, Vol. 39, No. 7, pp. 1987-2017, 2002
18. **Arnold, S. M.**, Saleeb, A.F. and N. Ali-Zoubi; "Deformation and Life Analysis of Composite Flywheel Disk Systems", Composite B: Engineering, Vol. 33, No. 6, pp. 433-459, 2002
19. Pahr, D.H. and **Arnold S.M.**; "Applicability of the Generalized Method of Cells for Aligned Short Fiber Composites", Composite B: Engineering, Vol. 33B, No. 2, pp.153-170.
20. Bednarcyk, B. A. and **Arnold, S. M.**; "Fully Coupled Micro/Macro Deformation, Damage and Failure Prediction for SiC/Ti-15-3 Laminates", ASCE, Journal of Aerospace Engineering, Vol 15, No. 3, pp. 74-83, 2002.
21. Pindera, M.J., Aboudi, J., and **Arnold, S.M.**; "Analysis of Spallation Mechanism in Thermal Barrier Coatings with Graded Bond Coats Using the Higher-Order Theory of FGMS", Engineering Fracture Mechanics, Vol. 69, pp. 1587-1606.

2001

22. Saleeb, A.F. and **Arnold, S. M.**; "A General Reversible Hereditary Constitutive Model: Part I Theoretical Developments", JEMT, Vol. 123, 2001, pp.51-64.
23. **Arnold, S. M.**, Saleeb, A.F., Castelli, M.G.; "A General Reversible Hereditary Constitutive Model: Part II Application To Titanium Alloys", JEMT, Vol. 123, 2001, pp. 65-73.
24. Saleeb, A.F., **Arnold, S.M.**, Castelli, M.G , Wilt, T.E., and Graf, W.E., "A General Hereditary Multimechanism-Based Deformation Model With Application to The

- Viscoelastoplastic Response of Titanium Alloys, Int. Jnl. Of Plasticity, Vol. 17, No. 10, pp. 1305-1350. Oct. 2001
25. Lissenden, C.J., **Arnold, S.M.**, and Saleeb, A.F., "Plastic Coupling and Stress Relaxation During Non-proportional Axial-Shear Strain-Controlled Loading", Jnl. Of Pressure Vessel Technology, Vol. 123, 2001, pp. 81-87.
 26. Bednarcyk, B. A., and **Arnold, S. M.**, "Micromechanics-based Deformation and Failure Prediction for Longitudinally Reinforced Titanium Composites", Composite. Science and Technology, Vol. 61, pp. 705-729, 2001.
 27. Aboudi, J., Pindera, M.J. and **Arnold, S.M.**; "Linear Thermoelastic Higher-Order Theory for Periodic Multiphase Materials", J. Of Applied Mech., Vol. 68, 2001, pp. 697-707.

2000

28. Pindera, M.J., Aboudi, J., and **Arnold, S. M.**, "The Effect of Interface Roughness and Oxide Film Thickness on the Inelastic Response of Thermal Barrier Coatings to Thermal Cycling", Journal of Materials Science & Engineering A, Vol. 284, No. ½, 2000, pp.158-175.
29. Aboudi, J. and **Arnold, S. M.**, "Micromechanical Modeling of the Finite Deformation of Thermoelastic Multiphase Composites", Mathematics & Mechanics of Solids, Vol. 5, No. 1, pp. 75-99.
30. Iyer, S.K., Lissenden, C.J., and **Arnold, S.M.**, "Local and overall flow in composites predicted by micromechanics", Composites: Part B, Vol. 31, pp. 327-343.
31. Lissenden, C.J., **Arnold, S.M.**, and Iyer S.K., "Flow/damage Surfaces for Fiber-Reinforced Metals having Different Periodic Microstructures", Int. J. Plasticity, Vol. 16, No. 9, pp. 1049-1074.

1999

32. Pindera, M-J., Aboudi, J., and **Arnold, S. M..**, "Higher-Order Theory For Functionally Graded Materials", Composites: Part B, Vol. 30, pp. 777-832.

1998

33. Pindera, M-J., Aboudi, J., and **Arnold, S. M..**, "The Effect of Microstructure on the Response of Functionally Graded Thermal Barrier Coatings", J. American Ceramic Society, Vol. 81, No. 6, pp. 1525-1536.
34. Pindera, M-J., Aboudi, J., and **Arnold, S. M..**, "Higher-Order Micro-Macrostructural Theory For the Analysis of Functionally Graded Materials", *Advanced Multilayered and Fiber-Reinforced Composites*, Y.M. Haddad (ed.), Kluwer Academic Publishers, Netherlands, pp. 111-132. Invited

1997

35. Aboudi, J., Pindera, M-J., and **Arnold, S.M.**, "Microstructural Optimization of Functionally Graded Composite Subjected to a Thermal Gradient Via the Coupled Higher-Order Theory", Composites: Part B (Engineering), Special Issue, Vol. 28B, pp. 93-108.
36. Pindera, M-J., Aboudi, J., and **Arnold, S. M..**, "Microstructural Effects in Functionally Graded Thermal Barrier Coatings", in *Functionally Graded Materials 1996*, I. Shiota and Y. Miyamoto (Eds.) Elsevier Science B.V., The Netherlands, pp. 113-121. Invited
37. Lissenden, C.J. and **Arnold, S. M.**, "Theoretical and Experimental Considerations in Representing Macro Flow/Damage Surfaces for Metal Matrix Composites", Int. Jnl of Plasticity, Vol.13, No. 4, pp. 327-358.

38. Kruch, S. and **Arnold, S. M.**, "Creep Damage and Creep-Fatigue Damage Interaction for Metal Matrix Composites "Applications of Continuum Damage Mechanics to Fatigue and Fracture, ASTM STP 1351, D.L. McDowell, Ed., American Society for Testing and Materials, pp. 7-28.
39. Wilt, T.E., **Arnold, S. M.**, and Saleeb, A.F., "A Coupled/Uncoupled Computational Scheme For Deformation and Fatigue Damage Analysis of Unidirectional MMC's", Applications of Continuum Damage Mechanics to Fatigue and Fracture, ASTM STP 1351, D.L. McDowell, Ed., American Society for Testing and Materials, pp. 65-82.

1996

40. **Arnold, S. M.**; Pindera, M. J.; and Wilt, T.E., "Influence of Fiber Architecture On The Inelastic Response of Metal Matrix Composites", Int. Jnl. of Plasticity, Vol. 12, No. 4 pp. 507-545.
41. Aboudi, J., Pindera, M-J., and **Arnold, S.M.**, "Thermoelastic Theory for the Response of Materials Functionally Graded in Two Directions, Int. Jnl. of Solids and Structures, Vol. 33, No. 7, pp. 931-966.
42. **Arnold, S. M.**, Saleeb, A.F., and Castelli M.G., "A Fully Associative, Non-linear Kinematic, Unified Viscoplastic Model for Titanium-based Matrices", *Life Prediction Methodology for Titanium Matrix Composite*, ASTM STP 1253, W.S. Johnson, J.M. Larsen, and B.N. Cox, Eds. American Society for Testing and Materials, Philadelphia, 1996, pp. 231-256.
43. **Arnold, S. M.**, Saleeb, A.F., Castelli, M.G., "A Fully Associative, Nonisothermal, Non-Linear Kinematic, Unified Viscoplastic Model For Titanium Based Matrices", *Thermo-Mechanical Fatigue Behavior of Materials: Second Volume*, ASTM STP 1263, M. Verrilli and M.G. Castelli, Eds. , 1996, pp.146-173.
44. Aboudi, J., Pindera, M-J., and **Arnold, S.M.**, "Thermoplasticity Theory for Bidirectionally Functionally Graded Materials, Jnl. of Thermal Stresses, Vol. 19, pp. 809-861.

1995

45. **Arnold, S. M.**, Saleeb, A.F. and Wilt, T.E., "An Investigation of the Modeling of Thermal/Dynamic Recovery and Nonlinear Hardening in Potential Based Viscoplasticity", Int. Jnl. of Engng. Mat. & Tech., Vol. 117, No. 2, pp. 157-167.
46. Bowman, R.R., Misra, A.K., and **Arnold, S. M.**, "Processing and Mechanical Properties of Al_2O_3 Fiber-Reinforced NiAl Composites", Met. Mat. Trans. , Vol. 26A, March, pp. 615-628.
47. Pindera, M.J., Aboudi, J., and **Arnold, S. M.**, "Limitations of the Uncoupled, RVE-Based Micromechanical Approach In the Analysis of Functionally Graded Composites", Mech. of Materials, Vol. 20, pp. 77-94.
48. Aboudi, J., Pindera, M-J., and **Arnold, S. M.**, "Thermo-Inelastic Response of Functionally Graded Composites", Int. Jnl. of Solids and Structures, Vol. 32, No. 12, pp. 1675-1710.
49. Pindera, M-J., Aboudi, J., and **Arnold, S. M.**, "Recent Advances in the Mechanics of Functionally Graded Composites, ", in Progress in Astronautics and Aeronautics, Aerospace Thermal Structures and Materials for a New Era, E.A. Thornton (Ed.), AIAA, 1995, pp. 181-203.
50. Aboudi, J., Pindera, M-J., and **Arnold, S. M.**, "A Coupled Higher-Order Theory for Functionally Graded Materials with Partial Homogenization, Composite Engineering, Vol. 5, No. 7, pp. 771-792.

51. Binienda, W.K. and **Arnold, S. M.**, “Driving Force Analysis in an Infinite Anisotropic Plate with Multiple Crack Interactions”, Int. Jnl. of Fracture, Vol. 71, pp. 213-245.

1994

52. **Arnold, S. M.**, and Saleeb, A.F., “On the Thermodynamic Framework of Generalized Coupled Thermoelastic-Viscoplastic -Damage Modeling”, Jnl of Int. Plasticity, Vol. 10, No. 3.,pp. 263-278.
53. **Arnold, S. M.**.. and Kruch, S., “A Differential CDM Model For Fatigue of Unidirectional Metal Matrix Composites”, Int. Jnl. of Damage Mechanics, Vol. 3, No. 2, pp.170-191.
54. **Arnold, S. M.**, Saleeb, A.F., Tan, H.Q. and Zhang, Y., “Explicit Robust Schemes for Implementation of a Class of Principal Value-Based Constitutive Models: Symbolic/Numeric Implementation”, Int. Jnl. of Num. Meth., Vol. 37, pp. 1931-1944.
55. **Arnold, S. M.**, Saleeb, A.F., Tan, H.Q. and Zhang, Y., “Explicit Robust Schemes for Implementation of General Principal Value-Based Constitutive Models”, Comp. Struc., Vol. 53, No. 6, pp. 1437-1451.
56. Aboudi, J., Pindera, M. J.., and **Arnold, S. M.**., “Elastic Response of Metal Matrix Composites with Tailored Microstructures to Thermal Gradients”, Int. J. Solids and Structures, Vol. 31, No. 10, pp. 1393-1428.
57. Aboudi, J., **Arnold, S. M.**., and Pindera, M. J.., “Response of Functionally Graded Composites to Thermal Gradients”, Composites Engineering, Vol. 4, No. 1, pp. 1-18.
58. Pindera, M. J.., **Arnold, S. M.**, and Williams, T. O., “Thermoplastic response of Metal Matrix Composites With Homogenized and Functionally Graded Interfaces”, Composites Engineering, Vol. 4, No. 1, pp.129-145.
59. **Arnold, S. M.** and Castelli, M.G., “Continuum Based Theoretical and Experimental Studies in Deformation and Damage of MMCs at NASA Lewis: Progress and Trends, Composite Engineering, Vol. 4, No. 8, pp. 811-828.
60. Levine, S.R., Duffy, S.F., Vary, A., Nathal, M.V., Miner, R.V., **Arnold, S.M.**, Castelli, M.G., Hopkins, D.A., and Meador M.A., “Composites Research at NASA Lewis Research Center”, Composite Engineering, Vol. 4, No. 8, pp. 787-810.
61. Pindera, M-J., Aboudi, J. and **Arnold, S. M.**, “Thermo-Inelastic Analysis of Functionally Graded Materials: Inapplicability of the Classical Micromechanics Approach”, in *Inelasticity and Micromechanics of Metal Matrix Composites*, G.Z. Voyatzis and J.W. Ju (Eds), Elsevier Science B.V., Amsterdam, The Netherlands, pp. 273-305.

1993

62. Binienda, W.K., **Arnold, S. M.**, and Tan, H.Q., “Stress Intensity Factors in a Fully Interacting Multi-Cracked Isotropic Plate “, Comp. Mech., Vol. 12, pp. 297-314.
63. Pindera, M. J.., Freed, A. D., and **Arnold, S. M.**., “Effects of Fiber and Interfacial Layer Morphologies on the Thermoplastic Response of Metal Matrix Composites “, Int. Jnl. of Solids and Structures, Vol. 30,No. 9, pp. 1213-1238.
64. **Arnold, S. M.** and Wilt, T. E., “Influence of Engineered Interfaces on Residual Stresses and Mechanical Response in Metal Matrix Composites”, Composite Interfaces, Vol. 1, No. 5, pp. 381-402.
65. **Arnold, S. M.** and Wilt, T. E., “A Deformation and Life Prediction of A Circumferentially Reinforced SiC/Ti 15-3 Ring”, Reliability, Stress Analysis, and Failure Prevention, Ed. R.J. Schaller, DE-Vol. 55, ASME, pp. 231-238.

1992

66. Arya, V.K. and **Arnold, S. M.**, "Viscoplastic Analysis of an Experimental Cylindrical Thrust Chamber Liner", AIAA Journal, Vol. 30, No. 3, March, pp. 781-789.
67. **Arnold, S. M.**, Arya, V.K., and Melis, M.E., "Reduction of Thermal Residual Stresses in Advanced Metallic Composites Based Upon a Compensating/Compliant Layer Concept", Jnl of Composites, Vol. 26, No. 9, pp.1287-1309.
68. Brindley, P.K., Draper, S.L., Eldridge, J.L., Nathal, M.V., and **Arnold, S.M.**, "The Effect of Temperature on the Deformation and Fracture of SiC/Ti-24Al-11Nb", Met. Trans, Vol. 23A, No. 9, pp. 2527-2540.

1991

69. Saleeb, A.F., Chang, T.Y. and **Arnold, S. M.**; "On the Development of Explicit Robust Schemes for Implementation of a Class of Hyperelastic Models in Large- Strain Analysis of Rubbers, Int. Jnl. of Num. Meth.

1990

70. Robinson D.N. and **Arnold S.M.**, "Effects of State Recovery on Creep Buckling Under Variable Loading ", Jnl of Applied Mechanics, Vol. 57, pp. 313 --- 320.
71. **Arnold, S. M.**, "Quantification of Numerical Stiffness for a Unified Viscoplastic Constitutive Model", Jnl of Eng Materials and Tech., Vol. 112,pp. 271-276.
72. Duffy S.F. and **Arnold S.M.**, "Noninteractive Macroscopic Reliability Model for Whisker-Reinforced Ceramic Composites", Jnl of Composite Materials, Vol. 24, pp. 293-308.
73. **Arnold S.M.** and Tan H.Q., " Symbolic Derivation of Potential Based Constitutive Equations", Computational Mechanics, Vol. 6, pp. 237-246
74. **Arnold, S. M.**, Tan, H.Q., Dong, X., "Application of Symbolic Computations to the Constitutive Modeling of Structural Materials", In Symbolic Computations and their Impact on Mechanics, Eds., A.K., Noor, I. Elishakoff, and G. Hulbert, ASME PVP, Vol. 205, pp. 215-229.
75. **Arnold, S. M.** and Tan, H.Q. "Computer Simulation of the Mathematical Modeling Involved in Constitutive Equation Development: Via Symbolic Computation" Mathematical and Computer Modeling, Vol. 14, Pergamon Press, pp.927-932.

1989

76. **Arnold, S. M.**, Robinson D.N., Saleeb A.F., " Creep Buckling of a Cylindrical Shell Under Variable Loading", Jnl of Eng Mech., ASCE, Vol. 115, No. 5, pp. 1054-1074.

1986

77. Assaad, M.C., **Arnold, S. M.**, Graf, W.E., and Rectenwald, J. A.; "An Alternative Multi-Region, Storage Technique for BEM Using Constant Elements," Microsoftware for Engineers, Vol. 2, No. 3, pp. 159-170.

Books/Monograms/Special Issues

1997

- 1) **Use of Composites in Multi-Phased and Functionally Graded Materials**, Composites Part B: Engineering, Special Issue, Vol. 28B, M.J. Pindera, J. Aboudi, A. M. Glaeser, and **S. M. Arnold**, (Eds); Selected papers presented during the FGM Symposium held at Second International Conference on Composite Engineering (ICCE/2), New Orleans, Louisiana, USA, August 21-24, 1995

1995

- 2) **Use of Composites in Multi-Phased and Functionally Graded Materials**, Composites Engineering, Special Issue, Vol. 5, No. 7, M.J. Pindera, J. Aboudi, **S. M. Arnold**, and W. F. Jones, (Eds); Selected papers presented at International Conference for Composite Engineering, New Orleans, Louisiana, USA, August 28-31, 1994.
- 3) **Computational Structures Technology**, Flight-Vehicle Materials, Structures, and Dynamics - Assessment and Future Directions, Vol. 6, A. K. Noor and S. L. Venneri, Eds., American Society of Mechanical Engineers, Chapter 3 - section 5 (**Arnold S.M.** and A.D. Freed)

1994

- 4) ***Use of Composites in Functionally Graded Materials***, Composites Engineering, Special Issue, Vol. 4, No. 1, M.J. Pindera, **S. M. Arnold**, J. Aboudi and D. Hui, (Eds); Functionally Graded, Advanced Composites Materials Symposium, University of Virginia, Charlottesville, USA, June 6-9, 1993.

NASA Technical Reports

2004

- 1) **Arnold S. M.** and Bednarcyk, B. A.; "MAC/GMC 4.0 Volume 1: Theory Manual", TM
- 2) **Arnold, S.M.,** Powers, L. and Glovan, R. "Design/Analysis and Manufacturability of Lightweight, Graded, Discontinuously Reinforced Aluminum Flat Faced Propellant Duct Flanges" TM
- 3) Song, G., Ma, N., Penney, N., Barr, T., Lee, H.J. and **Arnold, S.M.**; "Design and Control of a Proof of Concept Active Jet Engine Intake Using Shape Memory Alloy Actuators", NASA TM-2004-213124

2003

- 4) Saleeb, A.F. and **Arnold, S.M.** ; "Specific Hardening Function Definition and Characterization of A Multimechanism Generalized Potential-Based Viscoelastoplasticity Model", *NASA/TM 2003-212219*.
- 5) Aboudi, J., Pindera, M.J. and **Arnold, S.M.**; "Analysis of Plasma-Sprayed Thermal Barrier Coating with Homogeneous and Heterogeneous Bond Coats Under Spatially Uniform Cyclic Thermal Loading", *NASA/TM 2003-210803*.

2002

- 6) Aboudi, J., Pindera, M.J. and **Arnold, S.M.**; "Higher-Order Theory for Periodic Multiphase Materials With Inelastic Phases", *NASA/TM 2002-211469*.
- 7) Saleeb, A.F., **Arnold, S. M.** and Al-Zoubi, N. R.; "A Study of Time Dependent and Anisotropic Effects on the Deformation Response of Two Flywheel Designs", *NASA/TM 2002-212091*.
- 8) B. A. Bednarcyk and **S. M. Arnold**; "MAC/GMC 4.0 User's Manual, Volume 2: Keywords Manual", TM 2002-212077/Vol 2, 2002
- 9) B. A. Bednarcyk and **S. M. Arnold**; "MAC/GMC 4.0 User's Manual, Volume 3: Example Problem Manual", TM 2002-212077/Vol 3

2001

- 10) **Arnold, S.M.,** A.F. Saleeb, and Al-Zoubi, N.R., "Deformation and Life of Composite Flywheel Disk and Multi-Disk Systems", *NASA/TM-2001-210578*.
- 11) **Arnold, S.M.,** Bednarcyk, B.A., and Aboudi, J., "Thermo-Elastic Analysis of Internally Cooled Structures Using a Higher Order Theory", *NASA/TM 2001-210702*
- 12) Pahr, D.H. and **Arnold S.M.**; "Applicability of the Generalized Method of Cells for Aligned Short Fiber Composites", *NASA/TM-2001-211165*.
- 13) Bednarcyk, B. A., **Arnold, S. M.**, and Lerch, B.A.; "Fully Coupled Micro/Macro Deformation, Damage and Failure Prediction for SiC/Ti-15-3 Laminates" *NASA/TM 2001-211343*

2000

- 14) Goldberg, R.K and **Arnold, S. M.**, "A Study of Influencing Factors on the Tensile Response of a Titanium Matrix Composite with Weak Interfacial Bonding", *NASA/TM 2000-209798*.
- 15) Bednarcyk, B. A., and **Arnold, S. M.**, "A New Local Failure Model With Application to the Longitudinal Tensile Behavior of Continuously Reinforced Titanium Composites" *NASA/TM 2000-210027*.

- 16) Bednarcyk, B. A., and **Arnold, S. M.**, "A New Local Debonding Model With Application to the Transverse Tensile and Creep Behavior of Continuously Reinforced Titanium Composites", NASA/TM 2000-210029

1999

- 17) Assaad, M. and **Arnold, S. M.**, "An Analysis of the Macroscopic Tensile Behavior of a Nonlinear Nylon Reinforced Elastomeric Composite System Using MAC/GMC", NASA TM 1999-209066
- 18) **Arnold, S. M.**, B.A. Bednarcyk, D. Trowbridge, and Wilt, T.E., "Micromechanics Analysis Code With Generalized Method of Cells (MAC/GMC) User Guide: Version 3.0", NASA /TM 1999-209070
- 19) Pindera, M.J., Aboudi, J., and **Arnold, S. M.**, "The Effect of Interface Roughness and Oxide Film Thickness on the Inelastic Response of Thermal Barrier Coatings to Thermal Cycling", NASA/TM- 1999-209770.

1998

- 20) Castelli, M.G., **Arnold, S. M.** and Saleeb, A.F., "Specialized Deformation Tests for the Characterization of a Viscoplastic Model: Application to a Titanium Alloy", " NASA TM 106268. (in press)
- 21) Lissenden, C. J., **Arnold, S. M.** and Iyer, S. K., "Flow/Damage Surfaces for Fiber-Reinforced Metals Having Different Periodic Microstructures", NASA TM 1998-208805

1997

- 22) Saleeb, A.F. and **Arnold, S. M.**, "A General Reversible Hereditary Constitutive Model : Part I Theoretical Developments", NASA TM 107493.
- 23) **Arnold, S. M.**, Saleeb, A.F., Castelli, M.G., "A General Reversible Hereditary Constitutive Model : Part II Application To Titanium Alloys", NASA TM 107494.
- 24) Aboudi, J. and **Arnold, S. M.**, "Micromechanical Modeling of the Finite Deformation of Thermoelastic Multiphase Composites", NASA TM 107531.

1996

- 25) Lissenden, C.J. and **Arnold, S. M.**, "Critique of Marco Flow/Damage Surface Representations for Metal Matrix Composites Using Micromechanics", NASA TM 107321.
- 26) Wilt, T.E. and **Arnold, S. M.**, "Micromechanics Analysis Code (MAC) User Guide: Version 2.0", NASA TM 107290.

1995

- 27) Binienda, W.K. and **Arnold, S. M.**, "Driving Force Analysis in an Infinite Anisotropic Plate with Multiple Crack Interactions", NASA TM 106838.
- 28) **Arnold, S. M.**, Wilt, T.E., and Pindera, M.J., "Influence of Fiber Architecture On The Elastic and Inelastic Response of Metal Matrix Composites", NASA TM 106705.
- 29) Aboudi, J., Pindera, M.J., and **Arnold, S. M.**, "Thermoelastic Theory for the Response of Materials Functionally Graded in Two Directions With Applications to the Free-Edge Problem ", NASA TM 106882.

1994

- 30) Wilt, T.E., and **Arnold, S. M.**, "A Coupled/Uncoupled Deformation and Fatigue Damage Algorithm Utilizing The Finite Element Method", NASA TM 106526 .

- 31) **Arnold, S.M.**, Saleeb, A.F., and Castelli M.G., "A Fully Associative, Non-linear Kinematic, Unified Viscoplastic Model for Titanium-based Matrices", NASA TM 106609.
- 32) Wilt, T.E. and **Arnold, S. M.**, "Micromechanics Analysis Code (MAC) User Guide: Version 1.0", NASA TM 106706.
- 33) **Arnold, S. M.**, Saleeb, A.F., Castelli, M.G., "A Fully Associative, Nonisothermal, Non-Linear Kinematic, Unified Viscoplastic Model For Titanium Based Matrices", Symp. on Thermo-Mechanical Fatigue Behavior of Materials, ASTM, Phoenix, Nov 1994.

1993

- 34) **Arnold, S. M.**, Saleeb, A.F. and Wilt, T.E., "An Investigation of the Modeling of Thermal/Dynamic Recovery and Nonlinear Hardening in Potential Based Viscoplasticity", NASA TM 106122.
- 35) **Arnold, S. M.**, Saleeb, A.F., Tan, H.Q. and Zhang, Y., "Explicit Robust Schemes for Implementation of a Class of Principal Value-Based Constitutive Models: Symbolic/Numeric Implementation", NASA TM 106124.
- 36) **Arnold, S. M.**, Saleeb, A.F., Tan, H.Q., and Zhang, Y., "Explicit Robust Schemes for Implementation of General Principal Value-Based Constitutive Models", NASA TM 106123.
- 37) Aboudi, J., Pindera, M.J., and **Arnold, S. M.**, "Thermoelastic Response of Metal Matrix Composites With Large-Diameter Fibers Subjected to Thermal Gradients", NASA TM 106344.

1992

- 38) **Arnold, S. M.**, and Wilt, T.E., "Influence of Engineered Interfaces on Residual Stresses and Mechanical Response in Metal Matrix Composites", NASA TM 105438, March.
- 39) Binienda, W.K., **Arnold, S. M.**, and Tan, H.Q., "Calculation of Stress Intensity Factors in an Isotropic Multi-Cracked Plate: Part I Theoretical Development", NASA TM 105766.
- 40) **Arnold, S. M.**, Binienda, W.K., Tan, H.Q., Xu, M.H., "Calculation of Stress Intensity Factors in an Isotropic Multi-Cracked Plate: Part II Symbolic/Numeric Implementation", NASA TM 105823.
- 41) Pindera, M.J., Freed, A. D., and **Arnold, S. M.**, "Effects of Fiber and Interfacial Layer Morphologies on the Thermoplastic Response of Metal Matrix Composites", NASA TM 105802.
- 42) **Arnold, S. M.**, and Kruch, S., "A Differential CDM Model For Fatigue of Unidirectional Metal Matrix Composites", NASA TM 105726
- 43) **Arnold, S. M.**, Robinson, D.N. and Bartolotta, P., "Unified Viscoplastic Behavior of Metal Matrix Composites", NASA TM 105819.

1991

- 44) **Arnold, S. M.**, Arya, V.K., and Melis, M.E., "Reduction of Thermal Residual Stresses in Advanced Metallic Composites Based Upon a Compensating/Compliant Layer Concept", Air Force WL-TR-91-4020.
- 45) Misra, A.K., **Arnold, S. M.**, "Compliant Layer for the Ti₃Al Nb/SCS-6 Composite System", NASA TM 105344.
- 46) Arya, V.K., and **Arnold, S. M.**, "Viscoplastic Analysis of an Experimental Cylindrical Thrust Chamber Liner", NASA TM 103287, June.

- 47) **Arnold, S. M.**, Kruch, S., "Differential Continuum Damage Mechanics Models for Creep and Fatigue of Unidirectional Metal Matrix Composites", NASA TM 105213, Nov.
- 48) **Arnold, S. M.**, and Saleeb, A.F., "On the Thermodynamic Framework of Generalized Coupled Thermoelastic-Viscoplastic -Damage Modeling", NASA TM 105349, Nov.
- 49) Saleeb, A.F., and **Arnold, S. M.**, "Explicit Robust Schemes for Implementation of a Class of Principal Value-Based Constitutive Models: Theoretical Development", NASA TM 105345, Nov.

1990

- 50) **Arnold, S. M.**., Arya, V.K., and Melis, M.E., "Elastic/Plastic Analyses of Advanced Composites Investigating the Use of the Compliant Layer Concept in Reducing Residual Stresses Resulting from Processing", NASA TM 103204, Sept.
- 51) **Arnold, S. M.**., Tan, H.Q., Dong, X., "Application of Symbolic Computations to the Constitutive Modeling of Structural Materials", NASA TM 103225.
- 52) Binienda, W.K., Robinson, D.N., **Arnold, S. M.**, Bartolotta, P.A., "A Creep Model for Metallic Composites Based on Matrix Testing: Application to Kanthal Composites", NASA\ TM 103172, June. Also, Binienda, W.K. and Robinson, D.N., (1991) J. Engng. Mech., 117, No. 3, pp. 624-639.

1989

- 53) **Arnold, S. M.**, "A Thermoelastic Transversely Isotropic Thick Walled Cylinder/Disk Application: An Analytical Solution and Study", Oct , NASA TM 10232

1988

- 54) **Arnold, S. M.**, "A Qualitative Examination of the Fabrication Process for A Tubular Metal Matrix Composite Test Specimen", Jan , NASA TM100271.
- 55) **Arnold, S. M.**, ' A Transversely Isotropic Thermoelastic Theory", Aug, NASA TM 101302

1985

- 56) Chang, T. Y., **Arnold, S. M.** and Xiao, J. ; "FEGEN --- A Finite Element Model Generation Program (User Manual), " Department of Civil Engineering, University of Akron, June 1984, revised in 85.

1979

- 57) **Arnold, S. M.** and Critchfield, M.O., "Equations for Beams with both Vertical and Rotational Elastic End Restraint Subjected to Concentrated and Various Distributed Loadings", DTNSRDC 79-173-178, Sept.

NASA Tech Brief

1. Postprocessing Software for Micromechanics Analysis Code, Vol. 25, Issue 01, pg. 54, January 2001
2. Research On Life Prediction Methods For MMCs - Phase I, in print
3. Comprehensive Micromechanics-Analysis Code (MAC/GMC), Vol. 24, Issue 06, pg 38, June 2000
4. Computed Responses of Graded MMCs To Thermal Gradients, Vol. 21, Issue 03, pg. 19a, 1997
5. Fully-Coupled Deformation and Damage Analysis For MMC's, Vol. 20, Issue 10, pg. 80, 1996.
6. Improved Composite Fabrication Process Minimizes Damage To Fibers, Vol. 18, Issue 11, pg. 109, 1994

Conference Proceedings and Presentations

2005

- 1) **Arnold, S.M.**, Saleeb, A.F., Powers, L. and Lissenden, C.J.; "High Temperature Characterization and Prediction of Timetal 21S Cyclic and Cyclic-Relaxation Deformation Behavior Using a Multimechanism Viscoelastoplastic Model" Plasticity 2005, Hawaii, Jan 4 - 8, 2005
- 2) Lissenden, C.J., Doraiswamy, D., Solimine, P.A., and **Arnold, S.M.**; "Experimental Investigation of Cyclic and Time-Dependent Deformation of Titanium Alloy at Elevated Temperature", Plasticity 2005, Hawaii, Jan 4 - 8, 2005.
- 3) Bednarcyk, B.A., **Arnold, S.M.** and Powers, L.M.; "Coupling Analytical Micromechanics with Structural FEA for Micro/Macro Analysis of Titanium Matrix Composites, Plasticity 2005, Hawaii, Jan 4 - 8, 2005

2004

- 4) Saleeb, A.F., **Arnold, S.M.**, and Wilt T.E.; "General Hereditary Material Deformation Modeling With Special Emphasis on Characterization and Numerical Simulations within the Context of ABAQUS", 17th Annual ABAQUS Users' Conference, May 25-27, 2004, Boston, 2004.
- 5) **Arnold, S.M.**; "A seamlessly Integrated Toolset for Reversible and Irreversible Material Modeling: From Laboratory to Structural Analysis", during the "Developments in Web-Based Materials Property Databases Symposium VI" invited presentation, ASM Materials Solutions Conference, Oct 18-21, 2004.
- 6) C.J. Lissenden, D. Doraiswamy, and **S.M. Arnold**, 2004, "Fundamental results for cyclic viscoplastic modeling of beta titanium alloy at elevated temperature," International Conference on Fatigue Damage of Structural Materials V, 19-24 September 2004, Hyannis, Massachusetts.
- 7) Tzou, H.S., Chai, W.K. and Arnold, S.M.: "Dynamic Magnetoelastic Coupling and Control of Thin Magnetostrictive Structronic Shells", IMECE2004-61333
- 8) , Chai, W.K., DeHaven, J.G., Tzou, H.S., and Arnold, S.M.: "Magnetostrictive Actuation of Cylindrical Magneto-Structronic Shells", IMECE2004-61335

2003

- 9) Pindera, M.J., Aboudi, J. and **Arnold, S.M.**, "Analysis of Locally Irregular Composites Using the High Fidelity Generalized Method of Cells", AIAA-SDM Conference in Norfolk, VA , April 7th, 2003.
- 10) Butler, D. T.; Aboudi, J.; **Arnold, S.M.**, and Pindera, M.J.: "RLV Thrust Cell Liner Coating Analysis and Design Considerations", AIAA-SDM Conference in Norfolk, VA , April 7th, 2003.
- 11) Song, G., Penney, N., Barr, T., Lee H., and **Arnold, S.M.**; "Design and Control of a Proof-of-Concept Active Jet Engine Intake using Shape Memory Alloy Actuators", Int. Wkshp on Adv. Smart Materials and Smart Structures Technology, Hawaii, USA, June 23-25.
- 12) **Arnold, S.M.**, Bednarcyk, B. A., Yarrington, P.W., and Collier, C.S.; "An Enabling Computational Technology for Multi-scale Deformation, Damage and Failure Analysis of Multi-phased Composites", Plasticity 2003, Quebec City, July 7-11, 2003.
- 13) **Arnold, S.M.**, and Saleeb, A.F. "On The Development of Multimechanism Potential Based Viscoelastoplasticity", Plasticity 2003, Quebec City, July 7-11, 2003.
- 14) **Arnold, S.M.**, Powers, L. and Glovan, R. "Design/Analysis and Manufacturability of Lightweight, Graded, Discontinuously Reinforced Aluminum Flat Faced Propellant Duct Flanges" JANNAF, Dec 1-5, 2003, Colorado Springs, Colorado.
- 15) Bednarcyk, B. A., Yarrington, P.W., Collier, C. S., **Arnold, S. M.**, Pindera, M.J., Aboudi, J.: "Functionally Graded DRA For RLV Cryogenic Tanks", Thermal Stresses Congress at Blacksburg, VA, June 2003.
- 16) Wang, D.W., Tzou, H.S., **Arnold, S.M.** and Lee, H.-J.: "Dynamics and active control of Largely Deflected Active Structures Using the Finite Element Technique" , Proceedings of IMECE'03, 2003 ASME International Mechanical Engineering Congress and Exposition, Washington, D.C., Nov 16-21, 2003, IMECE2003-42390.
- 17) Wang, D.W., Tzou, H.S., and **Arnold, S.M.**: "Control of Static Shape, Dynamic Oscillation, and Thermally Induced Vibration of Nozzles" , Proceedings of IMECE'03, 2003 ASME International Mechanical Engineering Congress and Exposition, Washington, D.C., Nov 16-21, 2003, IMECE2003-42419.
- 18) Chai, W.K., Tzou, H.S., and Arnold, S.M.: "Micro-Structronics and Control of Hybrid Electrostrictive/Piezoelectric Thin Shells", Proceedings of IMECE'03, 2003 ASME International Mechanical Engineering Congress and Exposition, Washington, D.C., Nov 16-21, 2003, IMECE2003-42398.

2002

- 19) Thesken, J. C., Bowman, C. L., **Arnold, S. M.**, and Thompson, R. C.; "Time-Temperature Dependent Response of Filament Wound Composites for Flywheel Rotors," *Composite Materials: Testing and Design Fourteenth Volume, ASTM STP 1436*, C.E. Bakis, Ed., ASTM International, West Conshohocken, PA, 2003.
- 20) Saleeb, A.F., **Arnold, S. M.** and Al-Zoubi, N. R.; "A Study of Time Dependent and Anisotropic Effects on the Deformation Response of Two Flywheel Designs",

- Composite Materials: Testing and Design Fourteenth Volume, ASTM STP 1436*, C.E. Bakis, Ed., ASTM International, West Conshohocken, PA, 2003.
- 21) Bednarcyk, B., **Arnold, S.M.**, Aboudi, J., and Pindera, M.J.; "Accurate Micro/Macro Field Simulation For Composites Subjected to Fiber-Matrix Debonding Using HFGMC", 15th ASCE Engineering Mechanics Conf., June 2-5, 2002, Columbia University , New York, NY.
 - 22) C. S. Collier, P. W. Yarrington, J. Aboudi and M.-J. Pindera, **S. M. Arnold**, B. A. Bednarcyk; "Higher Order Theory – Structural/Micro Analysis Code (HOT-SMAC) Software For Thermo-Mechanical Analysis of FGMs", 2002 Int. Conference on Functionally Graded Materials, May 6-7, 2002, Denver, Colorado
 - 23) Shen, L., Bednarcyk, B., **Arnold, S.M.** and Lissenden, C.; "Flow Surfaces for Fibrous Metal Matrix Composites Predicted by the Method of Cells" 39th SES Annual Technical Meeting, University Park, Pennsylvania, 13-16 October 2002.

2001

- 24) **Arnold, S.M.** , M.J. Pindera, and Aboudi, J. : "Analysis of Plasma-Sprayed TBCs with Graded Bond Coats", 25th Annual Int. Conf. On Adv. Ceramics and Structures, Cocoa Beach, FL., Jan. 21-26, 2001
- 25) Bednarcyk, B. and **Arnold, S.M.**; "Micromechanics Based Modeling of Woven Polymer Matrix Composites", 42nd AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference and Exhibit, April 16-19, 2001,Seattle, WA., AIAA-2001-1567, A01-25288.
- 26) **Arnold, S.M.***: "Multiscale Deformation and Life Analysis of Complex Hereditary Materials", Engineering Science & Mechanics Seminar, Penn State, April 4, 2001

2000

- 27) Pindera, M.J., Aboudi, J. and **Arnold, S.M.**," TBC Stress Management Using Graded Bond Coat Architectures: A Critical Higher-Order Theory Analysis", Pre-nominated FGM Session at ICTAM2000, ref # 1775), Jan. 8 , 2000.
- 28) Pindera, M.J., Aboudi, J. and **Arnold, S.M.**, "Modeling Issues for Plasma-sprayed Thermal Barrier Coatings with Graded Bond Coats" , Int. Workshop on Functionally Graded Materials, March 26-28, 2000, Tsukuba City, Japan. To be published by Kluwer Academic Publishers.
- 29) **S.M. Arnold**, A.F. Saleeb, T.E. Wilt and D. Trowbridge, "UMAT Implementation of Coupled, Multilevel, Structural Deformation and Damage Analysis of General Hereditary Materials" ABAQUS User Conference, Newport, Rhode Island, May 31-June 2, 2000.

1999

- 30) Aboudi, J. , Pindera, M.J. and **Arnold, S.M.**, "Higher-Order Theory For Functionally Graded Cylinders" , PACAM VI, Rio de Genera, Jan. 4-8, 1999.
- 31) Bednarcyk, B.A. and **Arnold, S.M.**, "A New Local Failure/Debond Model With Application to the Tensile and Creep Behavior of Continuously Reinforced Composites" ,HITEMP Review 1999, Vol. II, CP 1999-208915/VOL2, paper 22.

- 32) Bowman C.L., Aiken, R., Lewandowski, J.J., and **Arnold, S.M.**, "Experimental Analysis of Titanium Matrix Long Fiber Composites With Controlled Fiber Placement", HITEMP Review 1999, Vol. II, CP 1999-208915/VOL2, paper 23.
- 33) Saleeb, A.F., **Arnold, S.M.**, Wilt, T.E., and Graf, W.E., "A General Hereditary Multimechanism-Based Deformation Model: Theory, Implementation, Characterization, HITEMP Review 1999, Vol. II, CP 1999-208915/VOL2, paper 25.
- 34) **Arnold, S.M.**, Saleeb, A.F., Castelli, M.G , Wilt, T.E., and Graf, W.E., "A General Hereditary Multimechanism-Based Deformation Model: Characterization of TIMETAL 21S, HITEMP Review 1999, Vol. II, CP 1999-208915/VOL2, paper 26.
- 35) Aboudi, J., Pindera, M. J., and **Arnold, S. M.**, "Higher-Order Theory for Cylindrical Components With Through-Thickness Functionally Graded Architectures", HITEMP Review 1999, Vol. II, CP 1999-208915/VOL2, paper 28.

1998

- 36) Lissenden, C.J., Iyer, S. K., and **Arnold, S. M.**, "Local and Overall Flow Surfaces for Composites Predicted by Micromechanics", 13th U.S. National Congress of Applied Mechanics, University of Florida, Gainesville, Florida, June 21-26, 1998.
- 37) Bednarcyk, B. A., and **Arnold, S. M.**, Efficient Modeling of Micro Damage Events Leading to Macro Failure of Continuously Reinforced Composites", ICCE/5 , Las Vegas, July 5-11.
- 38) Aboudi, J. , Pindera, M.J. and **Arnold, S.M.**, "Optimization of Cylindrical Functionally Graded Structural Components Using The Coupled Higher-Order Theory" , ICCE/5 , Las Vegas, July 5-11.
- 39) [*]**Arnold, S. M.**, Saleeb, A.F., Castelli, M.G., "A General Representation of a Titanium Alloy Capturing Reversible and Irreversible Hereditary Behavior", 35th Annual Technical Meeting Society of Engineering Science, Symp. Inelastic Deformation and Failure to celebrate Prof. E. Hart's 80th Birthday, Washington State University, Pullman, Washington, Sept. 27-30.
- 40) **Arnold, S.M.**, Aboudi, J. and Pindera, M.J., "The Time Dependent Response of TBCs with Wavy Interfaces Under Thermal Loading" ASM International, Materials Solutions Conference and Exposition-1998, Rosemont, Ill, Oct. 12-15

1997

- 41) Pindera, M. J., Aboudi, J., and **Arnold, S. M.**, "The Effect of Microstructure on the Response of Functionally Graded Thermal Barrier Coatings", HITEMP Review 1997, Vol. II, CP 10192, paper 23.
- 42) **Arnold, S. M.** and A.F. Saleeb, "A General Representation of a Titanium Alloy Capturing Reversible and Irreversible Hereditary Behavior " HITEMP Review 1997, Vol. II, CP 10192, paper 28.
- 43) Merrick, H.F., Aksoy, S.Z., Costen, **Arnold, S. M.**, Lerch, B. and Baaklini, G., "Spin Testing of SCS-6 Fiber Reinforced Ti-6Al-4V Disks", HITEMP Review 1997, Vol. II, CP 10192, paper 40.
- 44) Wilt, T.E., **Arnold, S. M.** and Goldberg, R., "Micromechanics Analysis Code, MAC, Features and Applications", HITEMP Review 1997, Vol. II, CP 10192, paper 30.

- 45) Binienda, W. and **Arnold, S. M.**, “Driving Force Analysis Given Complex Crack Interactions in Monolithic and Composite Materials”, HITEMP Review 1997, Vol. II, CP 10192, paper 36.
- 46) Lissenden, C.J. and **Arnold, S. M.**, “Factors Influencing Inelastic Flow Under Multiaxial Stress States: A Perspective of Their Importance to Composites”, HITEMP Review 1997, Vol. II, CP 10192, paper 38.

1996

- 47) Aboudi, J., Pindera, M. J., and **Arnold, S. M.**, “A Rational Methodology for the Analysis of Functionally Graded Materials: Theory, Application, and Perspective”, Gordon Research Conference, Kimball, Union Academy, New Hampshire, Aug 4-9, 1996.

1995

- 48) Aboudi, J., Pindera, M. J., and **Arnold, S. M.**, “HOTFGM-2D: A Higher-Order Theory for Metal Matrix Composites Functionally Graded in Two Directions”, HITEMP Review 1995, Vol. II, CP 10178, pp. 33:1-12.
- 49) **Arnold, S. M.**, Aboudi, J., Pindera, M.J., “Thermally-Induced Interlaminar Stresses in TBC-Protected Plate: A Material and Geometric Parametric Study,” HITEMP Review 1995, Vol. II, CP 10178, pp. 34:1-14.
- 50) Merrick, H.F., Aksoy, S.Z., Costen, M., Ahmad, J., and **Arnold, S. M.**, “Multiaxial Deformation of a SCS-6/Ti-6-4 Composite Ring”, HITEMP Review 1995, Vol. II, CP 10178, pp 35:1-9
- 51) **Arnold, S. M.** and Castelli, M.G., “What Constitutes A Model Material? A LeRC Structural Fatigue Branch Perspective”, HITEMP Review 1995, Vol. II, CP 10178, pp. 35a:1-18.

1994

- 52) **Arnold, S. M.**, Saleeb, A.F., and Castelli M.G., “A Fully Associative, Non-linear Kinematic, Unified Viscoplastic Model for Titanium-based Matrices”, ASTM, Symp. on Life Prediction Methodology for Titanium Matrix Composites, Hilton Head, March 1994
- 53) **Arnold, S. M.**, Saleeb, A.F., Castelli, M.G., “A Fully Associative, Nonisothermal, Non-Linear Kinematic, Unified Viscoplastic Model For Titanium Based Matrices “, Second Symp. on Thermo-Mechanical Fatigue Behavior of Materials, ASTM, Phoenix, Nov 1994.
- 54) Castelli, M.G., **Arnold, S. M.**., and Saleeb, A.F., “Specialized Deformation Tests for the Characterization of a Viscoplastic Model: Application to a Titanium Alloy”, Symp. on Fiber, Matrix, and Interface Properties, ASTM, Phoenix, Nov, 1994.
- 55) **Arnold, S. M.**., Pindera, M.J., and Wilt, T.E., “Influence of Fiber Architecture on the Inelastic Response of Metal Matrix Composites Via the Generalized Method of Cells (GMC),” HITEMP Review 1994, Vol. II, CP 10146, pp. 30:1-14.
- 56) Aboudi, J., Pindera, M.J., and **Arnold, S. M.**, “Recent Developments in the Mechanics of Functionally Graded Metal Matrix Composites”, HITEMP Review 1994, Vol. II, CP 10146, pp. 31:1-11.
- 57) Strait, J. S. , Bakis, C.E., and **Arnold, S. M.**, “Analysis of Time Dependent Deformation of SCS-6 Monofilaments Under Variable Mechanical Loads”, HITEMP Review 1994, Vol III, CP 10146, pp. 64:1-11..

1993

- 58) Williams, T.O., **Arnold, S. M.**, and Pindera, M.J., “Effectiveness of Graded Interfacial Layers in Reducing Residual Stresses in Titanium Matrix Composites”, Residual Stresses

- in Composites Measurement, Modeling \& Effects on Thermo-Mechanical Behavior, Eds, Barrera E.V. and Dutta, L., pp. 187-204, 1993 TMS Spring Meeting, Denver, Co, Feb 21-25.
- 59) [*] **Arnold, S. M.** and Wilt, T.E., "A Deformation and Life Prediction of a Circumferentially Reinforced SiC/Ti-15-3 Ring", ASME 10th Biennial Conference on Reliability, Stress Analysis and Failure Prevention, Albuquerque, New Mexico, Sept. 19-22.
 - 60) Wilt, T.E., and **Arnold, S. M.**, "A Computationally-Coupled Deformation and Damage Finite Element Methodology", HITEMP Review 1993, CP 19117, pp.(35-1)-(35-15).
 - 61) Biniendia, W.K., and **Arnold, S. M.**, "Damage Growth in Multi-Cracked Materials", HITEMP Review 1993, CP 19117, pp.(49-1)-(49-11).
 - 62) **Arnold, S. M.**, Wilt, T.E., Saleeb, A.F., and Castelli, M.G., "An Investigation of Macro and Micromechanical Approaches for a Model MMC System", HITEMP Review 1993, CP 19117, pp.(52-1)-(52-11).
 - 63) Urquhart, E.E., **Arnold, S. M.**, Pindera, M.J., and Aikin, B.J., "Simulation of Experimentally Observed Thermal Expansion Behavior of FeCrAlY-Based Composites", HITEMP Review 1993, CP 19117, pp.(54-1)-(54-12).
 - 64) Aboudi, J., Pindera, M.J., and **Arnold, S. M.**, "Response of a Functionally Graded MMC Plate Subjected to Thermal Gradient", HITEMP Review 1993, CP 19117, pp.(56-1)-(56-12).

1992

- 65) [*] **Arnold, S. M.** and Wilt, T. E., "Influence of Engineered Interfaces on Residual Stresses and Mechanical Response in Metal Matrix Composites", Fourth International Conference on Composite Interfaces, ICCI-IV, CWRU, Cleveland, OH, May 26-29.
- 66) [*] **Arnold, S. M.**, "Advanced High Temperature Composites in 21st Century Aeropropulsion Systems", Special Lecture given to Faculty and Students at Univ. of Virginia, Sept.
- 67) **Arnold, S. M.** and Wilt, T.E., "The Effect of Engineered Interfaces on Residual Stresses and Mechanical Response in Metal Matrix Composites", HITEMP Review 1992, CP 10104, pp.(33-1)-(33-16).
- 68) Pindera, M.J., Williams, T.O., Salzar, R.S. and **Arnold, S. M.**, "Optimization of Residual Stresses in Metal Matrix Composites Using the Multiple Concentric Cylinder Model", HITEMP Review 1992, CP 10104, pp.(34-1)-(34-21).
- 69) Krutenat, R.C. and **Arnold, S. M.**., "Alternative Techniques for Fabricating Fiber-Foil Composites With Engineered Interfaces", HITEMP Review 1992, CP 10104, pp.(35-1)-(35-10).
- 70) [*] **Arnold, S. M.** and Kruch, S. , "A Differential CDM Model for Fatigue of Unidirectional Metal Matrix Composites ", ASME Winter Annual Meeting, Anaheim , CA, Nov.
- 71) [*] **Arnold, S. M.**, Robinson, D.N. and Bartolotta, P., "Unified Viscoplastic Behavior of Metal Matrix Composites", ASME Winter Annual Meeting, Anaheim , CA, Nov.

1991

- 72) Binienda, W.K., **Arnold, S. M.**., Tan, H.Q., "Application of Symbolic Computation to Damage Growth in Multi-Cracked Brittle Materials", HITEMP Review, CP 10082, pp. 30(1-12)
- 73) Misra, A.K., **Arnold, S. M.**, "Compliant Layer for the Ti₃Al Nb/SCS-6 Composite System", NASA TM 105344, presented 15th Conf. on Metal Matrix, Carbon, and Ceramic Matrix Composites, Cocoa Beach, Fl, Jan.

1990

- 74) **Arnold, S. M.**., Arya, V.K., Melis, M.E., “Reduction of Thermal Residual Stresses in Advanced Metallic Composites By Application of A Compensating/Compliant Layer Concept”, HITEMP Review, CP 10051, pp. 28(1-11).
- 75) [*] **Arnold S. M.**., Tan, H.Q. and Dong, X.; “Application of Symbolic Computations to the Constitutive Modeling of Structural Materials. In Symbolic Computations and their Impact on Mechanics”, Eds. A.K. Noor, I. Elishakoff, and G. Hulbert, ASME PVP, Vol. 205, pp. 215-229.

1989

- 76) * **Arnold, S. M.**, “Analytical Modeling of High Temperature Materials for Propulsion and Power Applications”, Computational Structural Mechanics Review, NASA Langley, Aug.
- 77) **Arnold, S. M.**, Robinson, D.N. and Bartolotta P., “Unified Viscoplastic Behavior of Metal Matrix Composites: Experiment and Theory, HITEMP Review 1989, NASA CP 10039.
- 78) **Arnold, S. M.**. and Tan, H.Q. “Computer Simulation of the Mathematical Modeling Involved in Constitutive Equation Development: Via Symbolic Computation”, 7th International Conf on Mathematical and Computer Modeling, Aug 1989.

1988

- 79) **Arnold S.M.** and Tan H.Q., “ Symbolic Derivation of Potential Based Constitutive Equations”, Presented at Applied Mechanics and Eng Sciences Conf. UC Berkely, June.
- 80) Tan, H.Q., Doug X. and **Arnold S. M.**, “ Symbolic Derivation of Constitutive Equations”, HTD-Vol. 105, AMD-Vol. 97, Nov .
- 81) Tan, H.Q. and **Arnold, S. M.**, “ SDICE: An Expert System for the Symbolic Derivation of Potential Based Constitutive Equations”, Purdue University, Dec.

1986

- 82) Robinson, D.N., and **Arnold S.M.**, “Effects of State Recovery on Creep Buckling under Variable Loading, “ presented at 3rd Symposium on Nonlinear Constitutive Relations for High Temperature Applications, June, NASA CP-10010.

- Present papers at.; entitled
- indicates an invited lecture